CHERRY VALLEY FLOOD PLAIN MANAGEMENT STUDY

CROSS COUNTY, ARKANSAS

COOPERATING AGENCIES

CROSS COUNTY CONSERVATION DISTRICT

CITY OF CHERRY VALLEY

ARKANSAS SOIL AND WATER CONSERVATION COMMISSION

and

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

ROOM 2405

700 WEST CAPITOL AVENUE

LITTLE ROCK, ARKANSAS 72201

AUGUST 1986

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INTRODUCTION

The City of Cherry Valley and the Cross County Conservation District requested that the Arkansas Soil and Water Conservation Commission conduct a flood plain management study involving two streams in the City. The Commission requested assistance from the Soil Conservation Service in performing the study. Objectives of the study are to identify the following:

1. Flood hazards along the reaches of the streams being studied
2. Natural values
3. Flood plain management alternatives

The Cherry Valley Flood Plain Management Study report was prepared in accordance with the August 1974 Joint Agreement for Flood Hazard Analysis and Flood Plain Studies between the U. S. Department of Agriculture, Soil Conservation Service (SCS) and the Arkansas Soil and Water Conservation Commission (AS&WCC). Participation by the SCS is in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management", Section 6 of Public Law 83-566, and principles contained in Executive Order 11988, "Flood Plain Management".

Field surveys were performed by SCS personnel to obtain required topographic information for the study. Water surface profiles were computed using the Water Surface Profile (WSP2) computer program. Peak discharges were computed using procedures found in Water Resources Circular 11, "Floods in Arkansas, Magnitude and Frequency Characteristics Through 1968" by James L. Patterson. The limit of flooding was determined using the above publications.

Many variables are utilized in performing hydrologic studies. These variables include soil moisture condition, watershed land use, precipitation amount and time distribution, and channel characteristics that influence water flow. This study is based upon conditions existing at the time of field investigations and assumes that hydraulic structures do not fail or become obstructed.

STUDY AREA DESCRIPTION

The City of Cherry Valley (population 729) is located on the western slope of Crowley's Ridge in Cross County, Arkansas, 30 miles north of Forrest City. (See Vicinity map, next page). Cooper Creek and its tributary, Halk Creek, serve as channels for conveying runoff from Crowley's Ridge and the City to the L'Anguille River, about 3 miles to the west.

About 10,800 feet of Cooper Creek were studied, extending from a sewage lagoon on the west side of the City upstream past the eastern city limits. Halk Creek was studied from its junction with Cooper Creek upstream about 1,250 feet. The drainage area at the downstream end of the study area is 5.9 square miles.

The study area is located in the Southern Mississippi Valley Silty Uplands Land Resource Area. The mean annual temperature is about 61°F and the mean annual precipitation is about 49 inches.

Soils within this area are typically deep, loamy, level to steep soils which formed in deposits of loess or alluvium derived from loess deposits.

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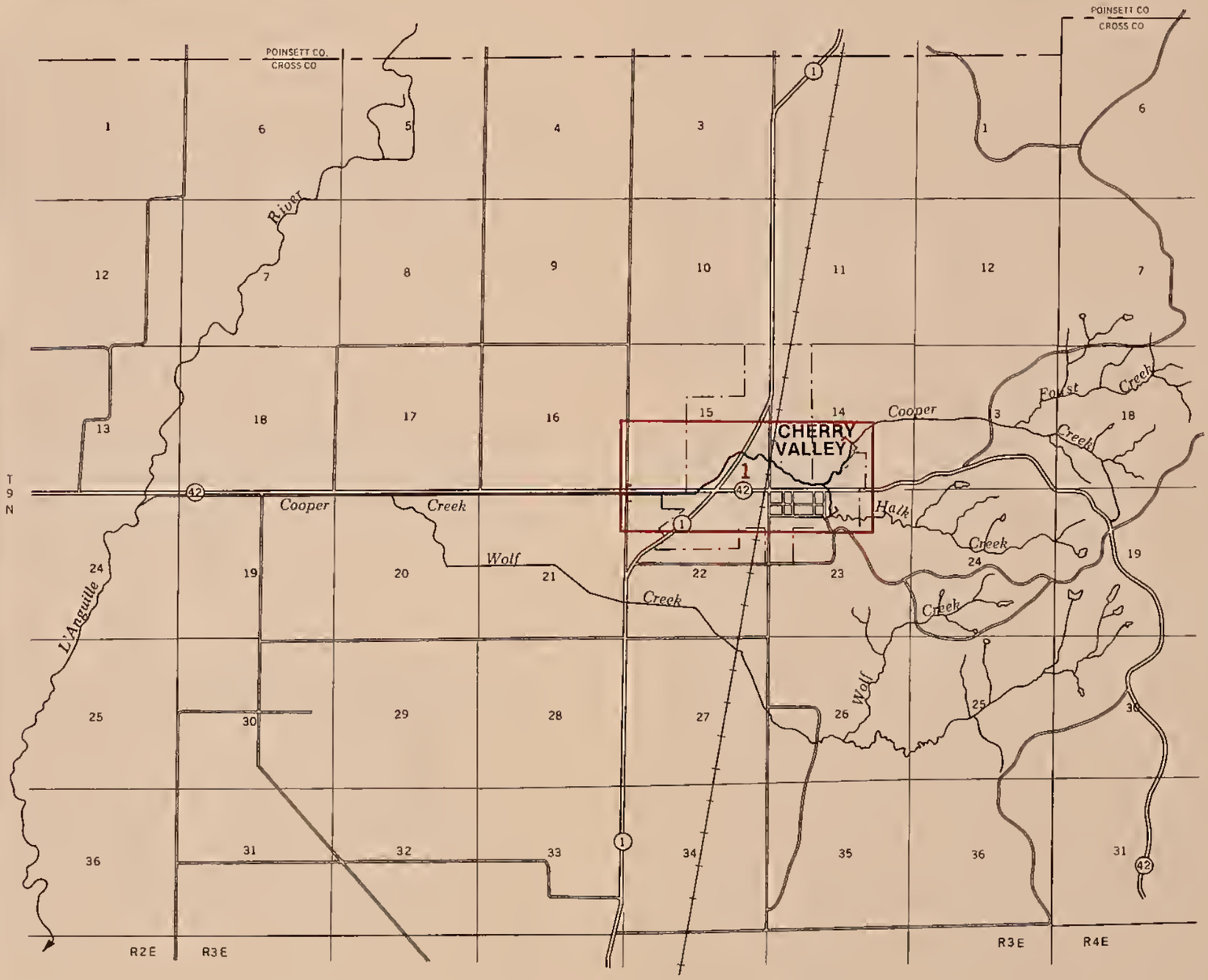
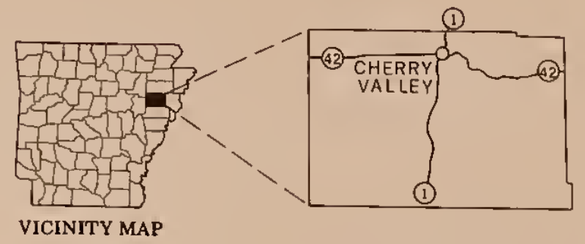




VICINITY MAP

LEGEND

STREAM CHANNEL

1 SHEET COVERAGE

[ ] LIMIT OF STUDY

PHOTOMAP SHEET LOCATION AND VICINITY MAP

CHERRY VALLEY

FLOOD PLAIN MANAGEMENT STUDY

CROSS COUNTY
ARKANSAS

1 2 3
MILE

1 2 3
KILOMETER

SOURCE
USGS 1/24,000 QUADRANGLES AND
INFORMATION FROM SCS FIELD PERSONNEL
POLYCONIC PROJECTION

OCTOBER, 1985 4R 39515

USDA SCS NATIONAL CARTOGRAPHIC CENTER FT WORTH TX 1986

Sheet 1 of 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

CHERRY VALLEY
FLOOD PLAIN MANAGEMENT STUDY
CROSS COUNTY, ARKANSAS

FLOOD HAZARD AREA

CHERRY VALLEY

JANUARY 1986

NATURAL VALUES

Soil Resources and Land Use

The major soil series in the Cherry Valley study area are Collins, Arkabutla, and Calloway. Collins soils are moderately well drained, moderately permeable level soils along stream channels. They have a surface layer of dark-brown to grayish-brown silt loam and a subsoil of yellowish-brown silt loam. Arkabutla soils are somewhat poorly drained, moderately permeable soils with a surface layer of brown to dark grayish-brown silt loam. The subsoil consists of brown silt loam over light-gray silt loam. Calloway soils are somewhat poorly drained, slowly permeable soils on broad flats and low ridges. The surface layer is dark-brown to brown silt loam and the subsoil is light brownish-gray silt loam.

The main land uses in the study area are cropland, 6 percent; grassland, 48 percent; urban, 7 percent; and woodland, 39 percent. There are 1,805 acres of prime farmland which is 48 percent of the study area.

Fish, Wildlife, and Water Quality

Natural values in the community of Cherry Valley have been greatly influenced by urban and agricultural activity. Cooper Creek has been channelized from the sewage lagoon to the west where it enters the L'Anguille River. Halk Creek and Foust Creek flow into Cooper Creek as it meanders through town. Water quality is influenced by agricultural runoff and municipal sewage operations and is expected to be poor. Fish habitat is limited due to the ephemeral nature of the creek. The creek is bounded by crops on the lower end while parts of the upper reach are forested which provides some diversity of habitat for squirrels, songbirds, and other small animals.

FLOOD PROBLEMS

Cherry Valley experienced a damaging flood in September 1978, a time of intense rainfall at several locations over the state. While no official National Weather Service rain gage is located near Cherry Valley, there is a gage at Beedeville in southeast Jackson County about 20 miles west of Cherry Valley. On September 13-14, a total of 13.97 inches of rainfall was recorded at Beedeville. No actual duration of the rainfall is available since only daily rainfall is recorded for this gage. The 100-year, 2-day rainfall total for this area is about 10 inches, which was exceeded at Beedeville.

It was reported that Cherry Valley received about 10 inches of rainfall during this period but no accurate determination of the amount or duration is available. An estimated 50-60 homes and businesses, along with 2 churches, received some degree of flooding. Some of the flooding may have been caused by blockage of highway bridges and a railroad trestle and diversion of the water through the developed area. No estimate of monetary damages is available.

While this extreme event produced damaging flooding in Cherry Valley, hydraulic and hydrologic investigations made during this study indicate that frequent flooding of the developed area should not be a major problem. The area inundated by the one- and ten-percent chance flood events is shown on the Flood Hazard Area Map. The channels in the study area are large and velocities are relatively high and out-of-bank flooding occurs only at a limited number of locations. Bridges and the railroad trestle on Cooper Creek are adequate if they do not become obstructed by debris during high flows. The 1 percent chance flood would inundate about 53 acres of undeveloped land in the study area. The 0.2 percent chance flood was not studied due to the absence of toxic chemical storage facilities, hospitals, or schools.

Some problems with bank erosion are occurring within the study area. Two specific areas are located near the sewage lagoon and at the city park. Bank erosion is active downstream from the Highway 42 bridge over Cooper Creek where the channel makes a sharp bend in alignment before it passes between the sewage lagoon levee and the highway shoulder. At the city park, flow is directed into a slope near one corner of a tennis court. Cooper Creek flow, in conjunction with water flowing out of the park, is causing bank erosion which may eventually cause serious damage to the tennis court and fence.

EXISTING FLOOD PLAIN MANAGEMENT

Cherry Valley is a participant in the National Flood Insurance Program and its map for insurance purposes is dated December 12, 1975. No detailed study has been performed and no base flood elevations have been determined. A resolution adopted by the City in 1975 addresses building permits and the avoidance of construction in flood prone areas. As of August 4, 1985, eleven policies were in force for a total coverage of $280,500.

ALTERNATIVES FOR FLOOD PLAIN MANAGEMENT

Present Conditions

No development is occurring in the flood plain identified in this study. This trend is expected to continue in the future as residents become aware of the limits of the flood prone area within the study area.

Nonstructural Measures

Nonstructural measures are intended to avoid or minimize flood losses but they do not alter the flood characteristics. Nonstructural measures to address flood problems in Cherry Valley are primarily those which would control construction in the undeveloped flood plain. Following is a discussion of the applicable measures:

1. Zoning is a means of controlling development within the designated flood plain. It is dependent upon the enactment and enforcement of city ordinances to control construction. This alternative would prevent construction of flood prone structures within the flood plain.

2. Building and Development Codes recognize that development within the flood prone area must be controlled. If local officials decide that some development in the flood plain is feasible, building codes would dictate the type of construction which could be installed. This alternative would allow controlled development in the flood prone area, and prevent flood damages to structures installed in the future.

3. Flood Insurance is a means to partially reimburse property owners for flood damages. Cherry Valley is currently participating in the flood insurance program which is administered by the Federal Emergency Management Agency (FEMA). Information developed during this study is available to FEMA to revise the Flood Insurance Rate Map and to establish actuarial rates.

Structural Measures are features used to modify or control peak flood flows. Examples are flood water retarding dams, channel work, dikes or other appropriate measures.

Economic benefits are negligible due to the limited flood damage evaluated during this study. Therefore, structural measures would not be economically feasible to install even though sites for flood water retarding dams are available upstream from the City. An evaluation of the effects of installing dams was not made because of the apparent lack of damageable values.

Some bank stabilization work is needed near the sewage lagoon and the city park. This work would consist of bank shaping and placement of riprap or construction of fences to retard the erosive effects of stream flow in the channel. Diversion of water at the tennis court and installation of a pipe drop to reduce erosion are also needed. The estimated cost of the bank stabilization at these two areas is about $26,000.

GLOSSARY

Flood Damages:

The destruction or injury of property due to rising water levels. In this study, flood damages were assumed to occur when the flood water elevation equaled or exceeded the lowest opening point into the damageable property.

Flood Frequency:

An expression or measure of how often a hydrologic event of given size or magnitude should, on an average, be equaled or exceeded. For example, on the average, a 10-year frequency flood is equaled or exceeded in size only once in 10 years or has a 10 percent chance of occurring during any given year.

Flood Plain:

A land area next to a stream which is periodically inundated by floodwater.

Flood Proofing:

Changing a structure and/or its contents so that water is kept out of the structure or the damage caused by water entry is reduced.

Flow Restrictions:

An obstacle which limits the volume of water which passes through a specific section. Examples include dikes, dense vegetation, levees, culverts, bridge openings, buildings, and/or similar structures.

Field Surveys:

The gathering of data with engineering equipment using horizontal and vertical distances to depict the features of stream valleys.

NGVD:

National Geodetic Vertical Datum of 1929.

Peak Discharge or Peak Flow:

The maximum volume of water per unit time that is expected as runoff from an area.

Percent Chance:

100 divided by the flood frequency in years.

Prime Farmland:

The soil that is best suited for producing food, feed, forage, fiber, and oilseed crops. It gives the highest yields with minimum inputs of energy and money and results in the least damage to the environment.

BIBLIOGRAPHY

1. Technical Release 61, WSP2 Computer Program, Engineering Division, USDA, SCS, May 1976

2. Water Resources Circular 11, "Floods in Arkansas, Magnitude and Frequency Characteristics Through 1968", Patterson, James L., 1971

3. Climatological Data - Arkansas, National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, NC, September 1978

4. Soil Survey of Cross County, Arkansas, USDA, Soil Conservation Service in cooperation with the Arkansas Agricultural Experiment Station, August 1968

BENCH MARK DATA

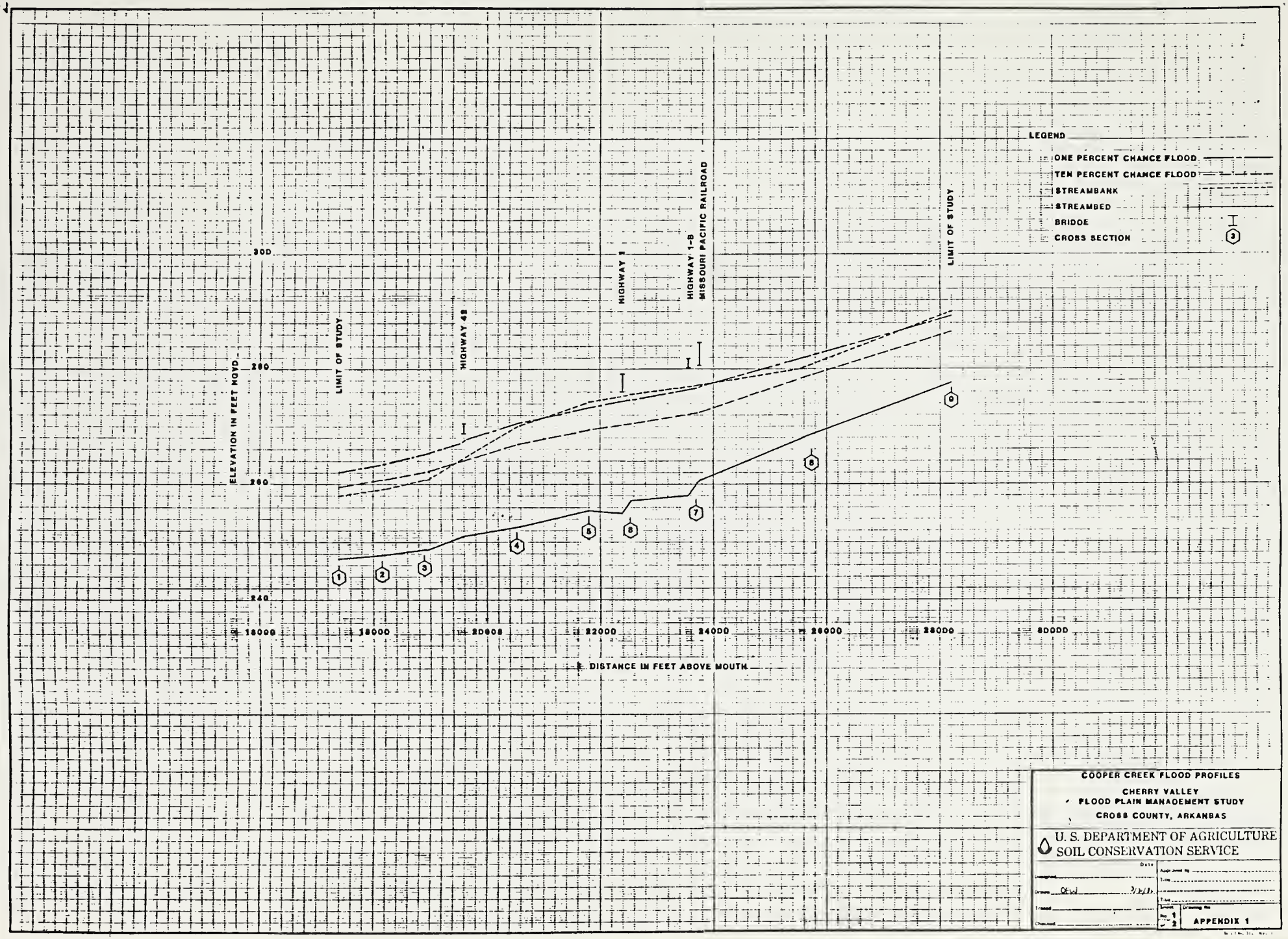
BM CC-1 Chiseled square on northwest wheel guard on southwest headwall of Highway 42 bridge over Cooper Creek. Elevation 270.98 NGVD.

BM CC-2 Chiseled square on southeast corner of southwest headwall of Highway 42 bridge over Halk Creek. Elevation 286.20 NGVD.

BM CC-3 Chiseled square on southeast corner of southeast headwall of Highway 1 bridge over Cooper Creek. Elevation 279.45 NGVD.

BM CC-4 Chiseled square on southeast corner of east headwall of Highway 1B bridge over Cooper Creek. Elevation 282.58 NGVD.

T E C H N I C A L A P P E N D I X



COOPER CREEK FLOOD PROFILES

CHERRY VALLEY
FLOOD PLAIN MANAGEMENT STUDY
CROSS COUNTY, ARKANSAS

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SOIL CONSERVATION SERVICE

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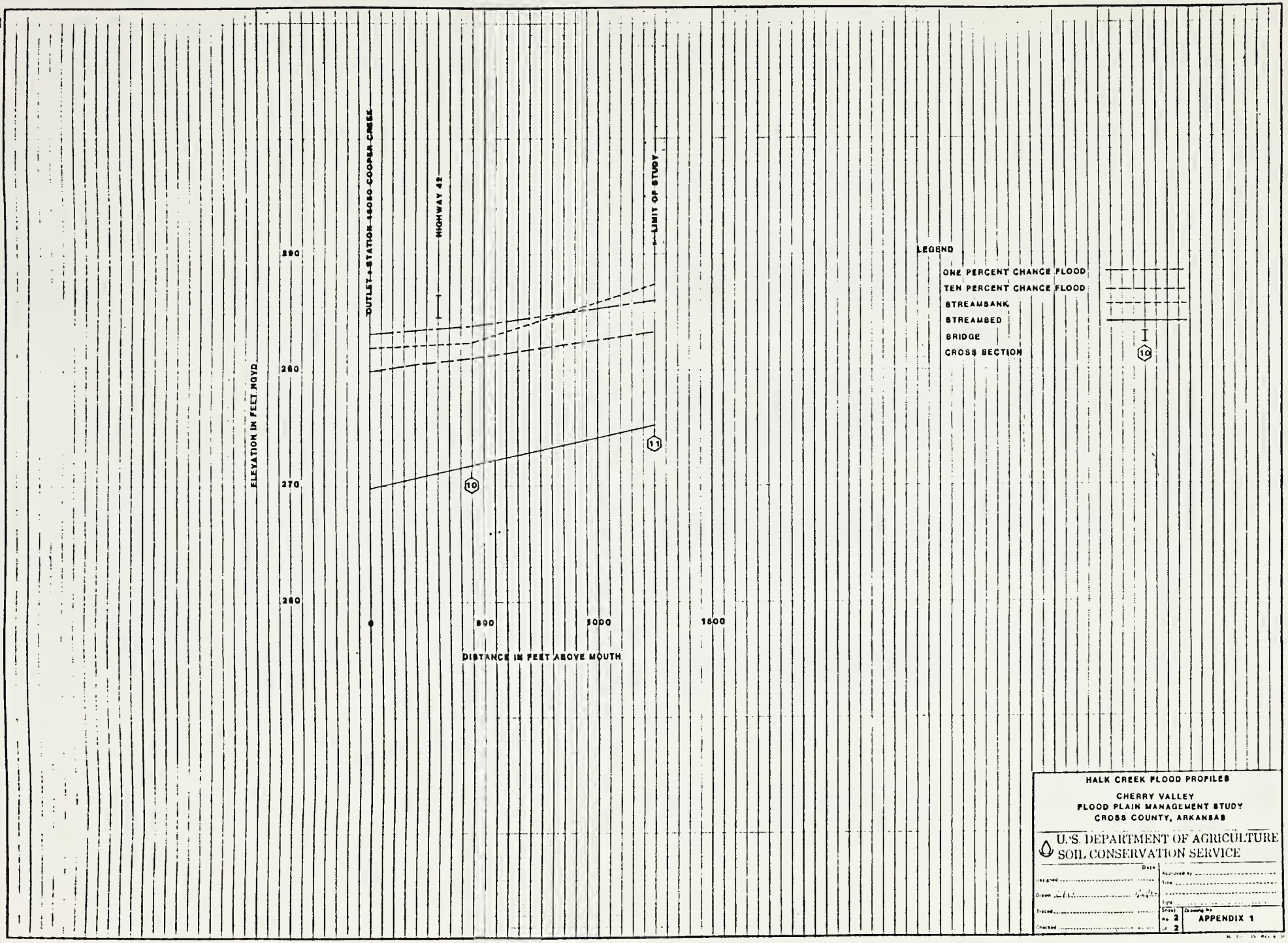

HALK CREEK FLOOD PROFILES

CHERRY VALLEY
FLOOD PLAIN MANAGEMENT STUDY
CROSS COUNTY, ARKANSAS

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APPENDIX 2
CROSS SECTION DATA
CHERRY VALLEY FLOOD PLAIN MANAGEMENT STUDY

CROSS SECTION (No.)	DRAINAGE AREA (Sq.Mi)	10% Chance Event DISCHARGE (cfs)	10% Chance Event ELEVATION (feet)	1% Chance Event DISCHARGE (cfs)	1% Chance Event ELEVATION (feet)
		Cooper Creek			
1	5.93	2640	259.4	5030	262.0
2	5.91	2630	260.7	5020	263.4
3	5.89	2620	262.1	5000	265.2
4	5.83	2590	266.9	4950	270.6
5	5.79	2580	269.5	4930	273.4
6	5.76	2570	270.6	4900	274.7
7	5.66	2520	272.4	4840	276.7
8	5.51	2480	279.0	4700	282.3
9	4.35	2100	286.5	3840	289.3
		Halk Creek			
10	1.06	700	281.1	1300	283.8
11	1.03	680	283.3	1280	286.0

APPENDIX 3

INVESTIGATION AND ANALYSIS

Topographic information used in this report was gathered by SCS personnel. Additional information was obtained from U. S. Geological Survey Topographic Quadrangle maps. Aerial photographs were obtained from the Agricultural Stabilization and Conservation Service Aerial Photography Field Office in Salt Lake City, Utah.

A staff biologist and resource conservationist evaluated the study area to determine land use, soils, and fish and wildlife resources. Aerial photographs and soil surveys were utilized in the determination. The findings have been incorporated in this report.

Water surface profiles were computed using survey data and various other parameters as input into the SCS WSP2 computer program. Output from this program included elevation - discharge curves at specific cross sectons. Peak discharge was computed for the one and ten percent chance flood events by using procedures found in Water Resources Circular 11, "Floods in Arkansas, Magnitude and Frequency Characteristics Through 1968" by James L. Patterson. Water surface elevations in the study were obtained using the above publications. A comparison of 1 percent chance flood elevations and house floor elevations revealed no in-house flooding. No URB1 computer program run was necessary because of the above determination.

The width of the flood area was determined at each of the cross sections. This was done by using the elevation of the flood profile at that location and determining the point at which that elevation intersected the ground on the plotted cross section. The flood boundary between cross sections was delineated with the aid of topographic quadrangle maps and additional topographic surveys.